

to 11.20 p. m. of the 13th. Another faint display occurred on the evening of the 19th.

Swartz Creek, Michigan: auroral streamers were observed during the evening of the 13th.

Moorhead, Minnesota: a faint auroral light was seen through the broken clouds at 10 p. m. of the 13th; at 11 p. m. the sky was entirely obscured. A broad auroral arch was observed in the north at 9.15 p. m. on the 19th, no streamers were visible; at 11 p. m. an indistinct light was still visible.

Thornville, Michigan: a faint auroral light was visible in the north on the evening of the 25th.

Sussex, Wisconsin: at 9.30 p. m. of the 20th an aurora was observed in the form of an arch, with a few streamers at its western extremity.

Madison, Wisconsin: a bright aurora was observed at 10 p. m. of the 13th, and an auroral arch with a few streamers was noted on the 24th, between 11.15 p. m. and midnight.

Duluth, Minnesota: an auroral arch was visible from 9.10 to 11.45 p. m. on the 19th; from 10.30 to 10.40 two complete arches were visible, well defined and very bright.

Saint Paul, Minnesota: a faint, straw-colored auroral light was visible from 9.45 to 11 p. m. of the 19th.

Fort Totten, Dakota: a brilliant auroral display occurred on the evening of the 13th. On the 19th a display consisting of shooting beams of pale yellow color was visible from 8.50 to 11.10 p. m. Displays also occurred on 24th, from 8.55 to 11.50 p. m., and on the 25th, from 8.50 to 11.33 p. m.

Fort Maginnis, Montana: an auroral light, covering 40° of the northern horizon and extending to an altitude of 30°, was observed from 10.30 to 11.45 p. m. of the 25th; long streamers advanced to and receded from the zenith with great rapidity during the display.

Dayton, Washington Territory: a pale green auroral light, with occasional streamers, was visible in the northern sky between sunset and 10.45 p. m., of the 24th.

Auroral displays, of which no descriptions have been received, were reported from various stations, as follows:

Winnipeg, Manitoba, 2d, 19th, 20th, 24th to 27th.

Wausau, Wisconsin, 3d.

Northfield, Minnesota, 11th.

Embarras, Wisconsin, 13th.

Fall River and Rowe, Massachusetts, 13th.

North Volney, New York, 13th.

Gardiner, Maine, 13th, 15th, 25th.

Manchester, Iowa, 13th, 15th, 19th, 25th.

Toronto, Ontario, 13th, 14th, 19th, 25th.

Allison, Kansas, 19th.

Traverse City, Michigan, 19th.

Prairie du Chien, Wisconsin, 19th, 25th.

Somerset, Massachusetts, 20th.

Sidney, Nova Scotia, 21st, 25th.

Halifax, Nova Scotia, 23d, 25th.

Bangor, Maine, 25th.

Contoocook, New Hampshire, 25th.

Garrettsville, Ohio, 25th.

Frederickton, New Brunswick, 25th.

Manistique, Michigan, 25th, 28th.

Ardenia, New York, 25th.

THUNDER-STORMS.

Thunder-storms have been reported in the different districts on the following dates:

New England.—1st to 14th, 18th to 21st, 23d, 26th, 30th, 31st.

Middle Atlantic states.—1st to 6th, 8th to 13th, 18th to 31st.

South Atlantic states.—1st to 7th, 10th to 20th, 22d to 31st.

Florida peninsula.—1st to 6th, 8th to 31st.

Eastern Gulf states.—1st to 7th, 9th, 10th, 11th, 13th to 18th, 22d to 31st.

Western Gulf states.—1st to 6th, 9th to 20th, 23d to 31st.

Rio Grande valley.—Rio Grande City, Texas: 12th.

Tennessee.—1st, 2d, 3d, 5th, 8th, 9th, 10th, 13th, 14th, 15th, 18th, 25th to 31st.

Ohio valley.—1st to 5th, 7th, 8th, 9th, 11th, 12th, 13th, 17th, 18th, 20th, 22d to 31st.

Lower lake region.—1st to 5th, 9th, 11th to 14th, 19th, 22d to 28th, 30th, 31st.

Upper lake region.—2d to 12th, 14th, 17th, 18th, 21st to 30th.

Extreme northwest.—1st, 3d, 4th, 7th, 8th, 9th, 14th, 15th, 20th to 26th, 28th, 29th, 31st.

Upper Mississippi valley.—1st to 5th, 7th to 15th, 17th, 18th, 21st to 30th.

Missouri valley.—1st to 4th, 6th to 30th.

Northern slope.—1st to 7th, 10th to 30th.

Middle slope.—1st to 21st, 23d to 30th.

Southern slope.—15th to 18th, 24th.

Southern plateau.—1st, 2d, 5th to 15th, 19th, 20th, 22d to 25th, 28th, 30th, 31st.

Middle plateau.—5th, 9th, 11th to 15th, 20th, 24th, 28th.

Northern Plateau.—10th to 15th, 17th, 20th, 25th, 26th.

North Pacific coast region.—6th, 11th, 17th, 25th, 27th.

Middle Pacific coast region.—Red Bluff, Hydesville, and Blue Lake, California: 12th.

South Pacific coast region.—Yuma, Arizona: 7th, 14th.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Fort Assinaboine, Montana, 7th, 15th, 20th, 21st.

Fort Bowie, Arizona, 1st.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the different districts on the following dates:

New England.—4th, 7th, 11th, 14th, 15th, 17th, 18th, 20th, 27th, 28th, 30th.

Middle Atlantic states.—6th, 7th, 12th, 18th, 30th, 31st.

South Atlantic states.—1st, 2d, 5th, 6th, 7th, 13th, 21st, 24th, 31st.

Florida peninsula.—2d, 10th, 21st, 23d, 27th, 29th.

Eastern Gulf states.—3d, 10th, 11th, 14th, 16th, 17th, 18th.

Western Gulf states.—4th, 7th, 16th, 21st, 24th, 26th.

Tennessee.—5th, 13th, 20th, 30th.

Ohio valley.—6th, 17th, 26th, 30th.

Lower lake region.—2d, 9th, 11th, 23d, 26th, 27th.

Upper lake region.—3d, 7th, 11th, 19th, 22d, 26th.

Extreme northwest.—1st, 10th.

Upper Mississippi valley.—15th, 16th, 20th, 21st, 22d, 25th, 28th, 29th.

Missouri valley.—9th, 11th, 18th, 21st.

Middle slope.—3d, 9th.

Middle plateau.—10th, 14th.

Northern plateau.—10th.

North Pacific coast region.—8th, 12th.

Middle Pacific coast region.—4th, 9th, 10th, 17th, 20th, 25th.

LUNAR HALOS.

Lunar halos were observed in the different districts on the following dates:

New England.—4th.

Middle Atlantic states.—3d, 4th, 5th, 8th, 29th, 30th, 31st.

South Atlantic states.—1st, 2d, 5th, 6th, 30th, 31st.

Florida peninsula.—5th, 9th, 27th, 29th, 31st.

Eastern Gulf states.—4th, 9th, 10th, 29th.

Western Gulf states.—2d, 4th, 9th, 30th.

Tennessee.—31st.

Ohio valley.—5th, 11th, 29th, 30th.

Lower lake region.—1st, 3d, 4th, 12th, 28th, 31st.

Upper lake region.—1st, 3d, 28th, 31st.

Extreme northwest.—29th.

Upper Mississippi valley.—1st, 3d, 7th.

Missouri valley.—2d, 4th, 5th, 30th.

Middle slope.—2d, 9th.

Southern slope.—5th.

Southern plateau.—28th, 29th.

Middle Pacific coast region.—9th.

MIRAGE.

Webster, Day county, Dakota: a mirage appeared at sunrise on the 25th, plainly showing the town of Bristol, eleven miles west of Webster.

Mirage was also observed at Traverse City, Michigan, on the 20th, and at Salina, Kansas, on the 31st.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-nine stations show 4,891 observations to have been made, of which five were reported doubtful; of the remainder, 4,886, there were 3,995, or 81.8 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for July, 1884:

Date— July, 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr's	Spots	Gr's	Spots	Gr's	Spots	Gr's	Spots	
4, 11 a. m.	3	42†					7	85†	Many of the spots small.
6, 3 p. m.	0	0	1	15†	0	0	0	50†	
7, 4 p. m.	1	3	1	10†	1	3	6	45†	
9, 4 p. m.	0	10†	2	20†			4	23†	
10, 5 p. m.	1	3	2	2	0	3	3	20†	
13, 4 p. m.	0	10†	0	0	0	0	3	30†	
14, 5 p. m.	0	5†	0	3	0	0	3	35†	
15, 4 p. m.	0	5†	1	1	0	0	2	40†	
16, 6 p. m.	1	2	0	5†	1	2	3	30†	
17, 11 a. m.	0	0	0	5†	0	0	2	30†	
19, 11 a. m.	1	2	0	15†	1	2	3	4	
20, 5 p. m.	1	3	1	1	1	3	3	12	
21, 5 p. m.	1	3	0	0	1	2	4	20†	
22, 12 m.	0	5†	0	0	0	0	4	25†	
23, 4 p. m.	0	5†	0	0	0	0	3	30†	
27, 5 p. m.							3	30†	
30, 9 a. m.							3	25†	

Facula were seen at the time of every observation. †Approximated.

Sycamore, New York: on the 21st several sun spots were observed, two of which were large and black.

DROUGHT.

Fort Davis, Texas: the "water-holes" in this part of the state are rapidly drying up. The grass is badly scorched and cattle are suffering in consequence of poor pasturage.

Reports from Cantonment, Indian Territory, on the 14th, stated that the corn crop in that region was suffering for rain.

Galveston, Texas, 14th: reports from San Antonio state that the sheep and cattle raising interests in the western part of Texas, are suffering from the effect of the prolonged drought. The streams on the American side of the Rio Grande river are reported to be dry.

Dodge City, Kansas, 17th: drought has caused injury to the crops in this part of the state.

Wauseon, Fulton county, Ohio: for thirty-two days preceding July 23d, only 0.26 inch of rain fell; much inconvenience resulted from scarcity of water.

Wausau, Marathon county, Wisconsin: from the 4th to 22d the weather was unusually dry; small streams dried up, and the water in the Wisconsin river reached a very low stage; vegetation suffered from lack of rain; a heavy fall of rain occurred on the 22d.

Thornville, Lapeer county, Michigan: from the beginning of the month until the 23d, the weather was very dry; after the 23d the rains were plentiful.

The following extracts are from the Pittsburg "Daily Post" of July 26, 1884.

CINCINNATI, Ohio, July 24.—Up to the first day of July the season in the Ohio valley, within a radius of two hundred miles from Cincinnati, was highly favorable for all the crops. There were frequent rains and the temperature was in every way such as to promote the growth of the crops. Since that date there has been no general rain in this region, and the local showers have been limited to small areas and have been infrequent and insufficient.

All through southern Ohio and Indiana and northern Kentucky the wagon roads are covered with dust. Wheat is all harvested and the most of it has been threshed. The dry weather has been favorable for harvesting and threshing. Early sown oats have escaped injury, but the late sown are suffering. Hay, which the rains of the spring months and of June set so thick on the ground, has had its growth checked by the July drought. Corn is the greatest sufferer of all the grains. In a few fields of low, irrigated bottom lands the corn looks vigorous and thrifty, but everywhere else, in upland and lowland, the outlook is already discouraging and is growing more so every day. Corn, in lands that usually yield from forty-five to seventy-five bushels per acre, is now not more than three or four feet high and in full tassel. Should seasonable weather set in and continue from this time forward, such corn might yield three-fourths of the average crop. On the other hand, if the present drought should continue eight or ten days longer no change of season for the better afterward could save the crop. One-half of it would scarcely be worth cutting for fodder, and the other half would average not more than a third of the usual yield. Most of the few showers that have fallen since the first of this month have been within a few miles of the Ohio river, as was that of yesterday. Further north, in Ohio and Indiana, and further south, in Kentucky, the drought has been unmitigated. Potatoes and garden stuff have been seriously checked in their growth. To aggravate the situation, the common meadow grasshoppers have increased in a few small areas in the most seriously parched regions, where they have invaded gardens and vineyards and cut down everything before them. The large streams have shrunk to rivulets and the brooks and marshy lands are drying up, endangering the existence of live stock. Sparks from locomotives fire the dead grass along the railways. A good rain, spreading over a wide stretch of country, within three or four days, would be worth millions of dollars to this part of the Ohio valley, and the continuance of good, seasonable weather until the 1st of September, would be worth millions of dollars more.

CINCINNATI, Ohio, July 25.—Rain fell at Indianapolis and in the belt eastward through central Ohio as far as Wheeling last night, but none fell here and in southern Ohio. A report from Youngstown says the drought has caused considerable loss to farmers. Those along the railroads watch night and day to prevent fire. A Germantown, Butler county, special says that region is scourged with the severest drought for years. The tobacco crop is very much injured and corn threatened. The crops of wheat, oats, and hay are unusually fine.

Lancaster, Fairfield county, Ohio: during the night of the 24-25th an abundant rain fell here, which was the first precipitation of any consequence that had occurred since the 4th. The corn, which had been looking well, began to shrivel up and many farmers were apprehensive that the quality would be inferior. The rainfall above-mentioned has placed the crop beyond danger, and an unprecedented yield is now promised.

Wapakoneta, Anglaise county, Ohio: prior to the abundant rains of the 25th the crops, especially the corn and potatoes, in this county suffered from drought.

Springfield, Clark county, Ohio: the long-continued and damaging drought which prevailed in this county was terminated by a heavy rainfall on the 25th.

Mount Gilead, Morrow county, Ohio: all kinds of crops, especially corn, suffered serious injury from the protracted drought which prevailed up to the 24th. Rain began to fall at 3 p. m. of that date and continued during almost the entire night and was of great benefit to farming interests.

Montgomery, Alabama: reports on the 26th from various localities adjacent to this place stated that the cotton crop was suffering serious injury from drought.

Toledo, Ohio, 31st: although the crops in this part of the state were injured by the extremely dry weather during the early part of the month, they were revived by subsequent rains, and at the close of the month were in promising condition.

Edgington, Rock Island county, Illinois: the rains of July in this county were light and of local character; in some localities the crops are suffering from drought.

Fort Madison, Lee county, Iowa: the month was very dry in this locality; only 1.41 inches of rain fell at Fort Madison.

Syracuse, New York, 31st: the weather during the month was very dry in this part of the state, and corn has suffered seriously in consequence.

METEORS.

Bordentown, Burlington county, New Jersey: at 8.20 p. m. of the 3d a meteor apparently rose from beneath the horizon and slowly passed from north-northeast towards the north-northwest, in a direct line over from 50° to 60°, at an altitude